



# Macho: Programming With Man Pages

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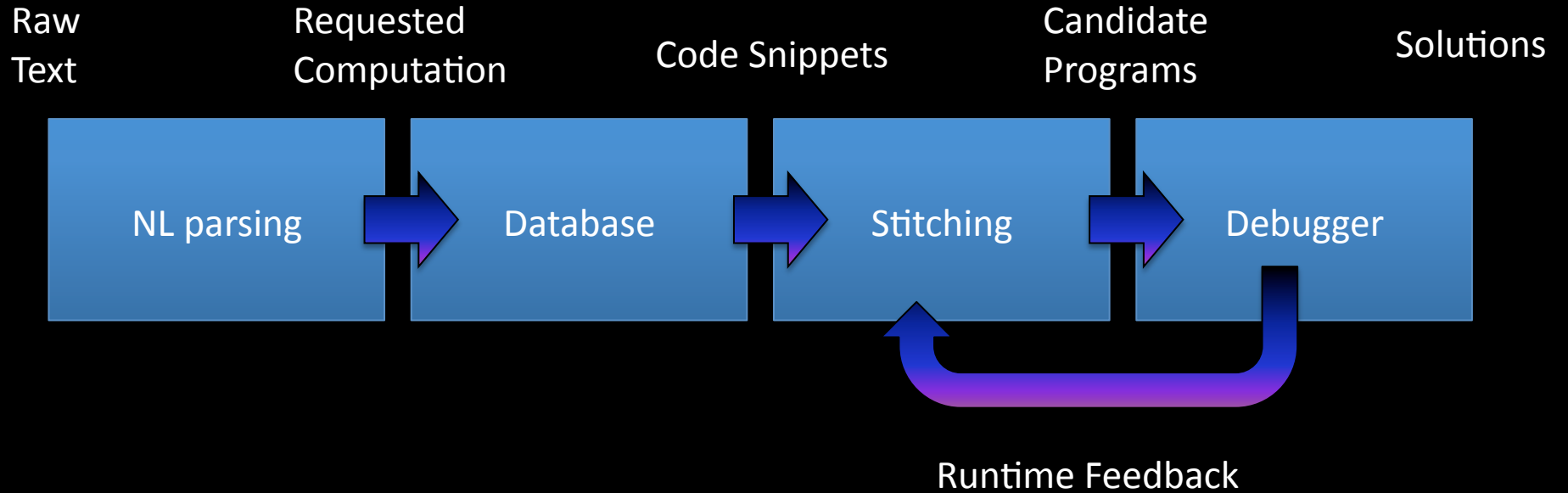


Programming is hard!

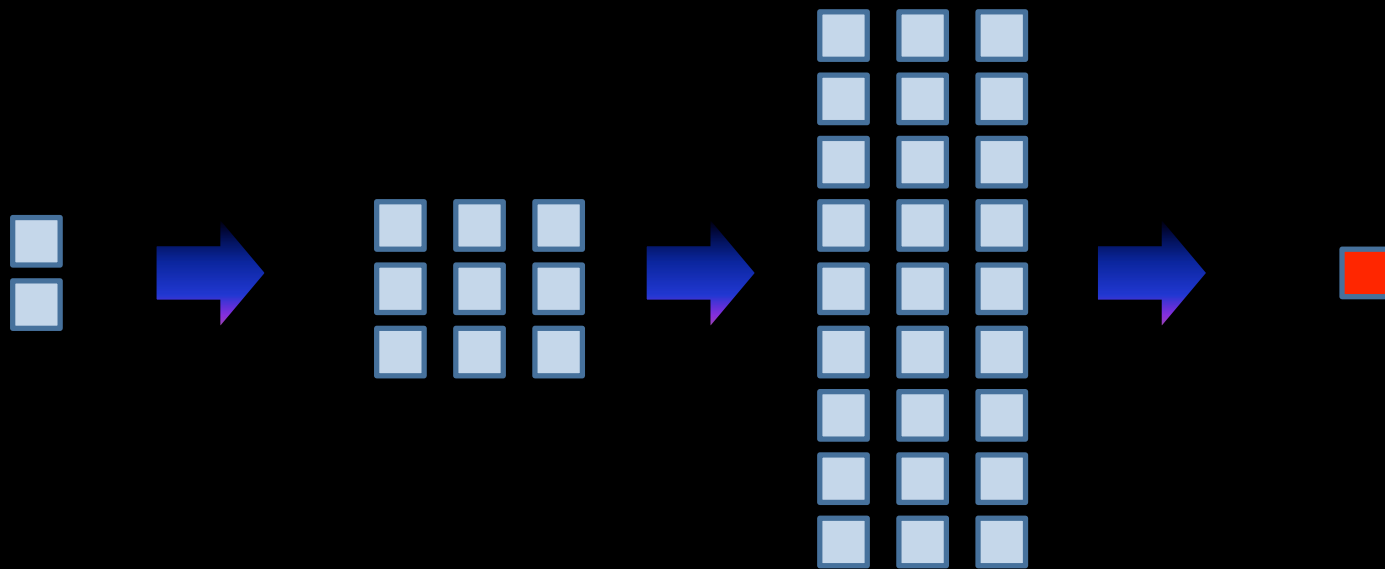
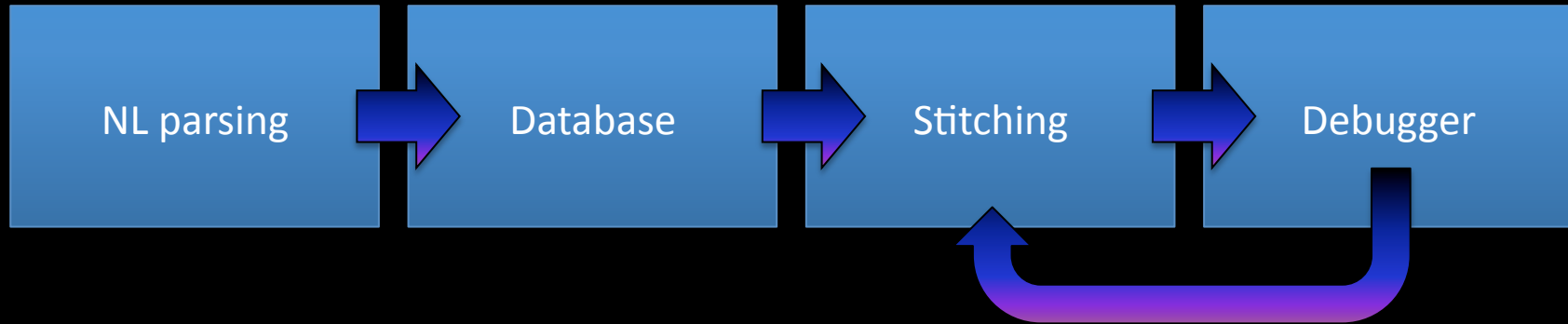
Lots of Automated Tools

# Automating Programming

# Macho Architecture



# The Trick



Examples!

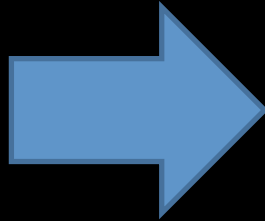
# The Example (LS)

Print the names of files in a directory. Sort the names.



# Extract Implied Computation

Print the names of  
files in a directory.  
Sort names.



directory -> files  
files -> names  
print(names)  
sort(names)

# Use Programmer's Labels

```
public static void main(String[] args) {  
  
    ....  
  
    //first (original) database  
    files = directory.listFiles();  
  
    ....  
}
```



# Input to Synthesis: LS1

```
public static void ls1(java.lang.String p_directory) {
    java.io.File tmp = new File(p_directory);
    java.io.File[] files = tmp.listFiles();
    int tmp_0 = files.length;
    java.lang.String[] tmp_1 = new java.lang.String[tmp_0];
    for(int tmp_3 = 0; tmp_3 < files.length; ++tmp_3) {
        java.io.File tmp_2 = files[tmp_3];
        java.lang.String names = tmp_2.getName();
        tmp_1[tmp_3] = names;
    }
    Arrays.sort(tmp_1);
    for(int tmp_5 = 0; tmp_5 < tmp_1.length; ++tmp_5) {
        java.lang.String tmp_4 = tmp_1[tmp_5];
        System.out.println(tmp_4);
    }
}
```

Bugs!

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# Synthesized Version of LS

```
public static void ls3(String p_dir) {
    java.io.File tmp = new File(p_dir);
    java.io.File[] files = tmp.listFiles();
    boolean tmp_3 = tmp.isDirectory();
    if(tmp_3) {
        Arrays.sort(files);
        for(int tmp_1 = 0; tmp_1 < files.length; ++tmp_1) {
            java.io.File tmp_0 = files[tmp_1];
            java.lang.String names = tmp_0.getName();
            boolean tmp_2 = tmp_0.isHidden();
            if(!tmp_2)
                System.out.println(names);
        }
    }
    else
        System.out.println(tmp + "");
}
```

# Pure NL Spec

Take the path `"/home/zerocool/"` If the path is a file, print it. Otherwise get the list of files in the directory. Sort the result alphabetically. Go over the result from the beginning to the end: If the current element's filename does not begin with `."`, print it.



# Macho

Print the names of files in a  
directory. Sort the names.

+ simple example

# Input Synergy

